COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

RESPONSE OF BAY STATE GAS COMPANY TO THE
ELEVENTH SET OF INFORMATION REQUESTS FROM THE D.T.E.
D. T. E. 05-27

Date: June 23, 2005

Responsible: Steven A. Barkauskas, Vice President Total Rewards
NiSource Corporate Services Company

DTE-11-26 Has the Company performed any overall unit-labor cost comparability studies between itself and other utilities and/or other industries, which relate overall unit-labor costs to employee productivity? If so, please provide a copy of any such study performed.

Response: Please see Bay State's response to DTE-11-25.

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RESPONSE OF BAY STATE GAS COMPANY TO THE
TWELFTH SET OF INFORMATION REQUESTS FROM THE D.T.E.
D. T. E. 05-27

Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-1 Refer to Exh. BSG/JAF-2, Sch. JAF-2-8, at 2. Please explain the rationale for the ABRAM to be effective June 1, 2005 and not at the beginning of the rate year.

Response: The Company filed all its proposed tariffs, including the ABRAM, with an effective date of June 1, 2005, which includes a re-filing and renumbering of Bay State's entire tariff. June 1, 2005 was the earliest date that the Company is allowed to request as an effective date by filing on April 27, 2005. June 1 is the requested effective date for the mechanism to adjust base rates annually, while the first proposed effective date of the base rate adjustment in accordance with the ABRAM is on November 1, 2006, a year after the initial rates are implemented for the rate year. As set out in the ABRAM tariff, Schedule JAF-2-8, at 2 (Section 2.0) and at 5 (Section 6.0), the first ABRAM change to the initial base rates shall be effective November 1, 2006.

The June 1 date also is of significance in that it is the proposed date by when the Company proposes to file its annual base rate adjustment for administrative reasons. That is, filing by June 1 should give the Department and Company sufficient review and process time for the rate adjustment to become effective on November 1.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-2 Refer to Exh. BSG/JAF-2, Sch. JAF-2-8, at 6. Please indicate the units of measurement for the second term of the PBR Price Cap Adjustment Formula. i.e., whether "dollars" or "percentage"? If "dollars", please explain how a dollar amount can be added to a percentage to come out with a percentage PBR_CAP.

Response: The PBR Price Cap Adjustment Formula set forth in Section 7.3 of Exhibit BSG/JAF-2, Schedule JAF-2-8 is as follows:

$$PBR\_CAP_T = (GDPPI_{T-1} - X) + \frac{(Z_{REV} + ESM_{REV})}{(BASE\_REV_{T-1} - SIR\_REV_{T-1})}$$

The units of measurement for the first term, $(GDPPI_{T-1} - X)$, are a percentage. The units of measurement for the numerator of the second term, $(Z_{REV} + ESM_{REV})$, are dollars. The units of measurement for the denominator of the second term, $(BASE\_REV_{T-1} - SIR\_REV_{T-1})$, are dollars. Therefore, the second term represents a percentage because dividing the units of measure of the numerator by the same units of measure of the denominator yields a factor of one.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager. Regulatory Policy

DTE-12-3 Refer to Exh. BSG/JAF-2. Please provide on disk in Excel format all data and supported formula used in developing § 11.0 of Sch. JAF-2-8 and the Sch. JAF-2-9 and Sch. JAF-2-10.

Response: Schedule JAF-2-8 was created in Microsoft Word and does not include any formulas.

Excel files for Schedules JAF-2-9 and JAF-2-10 were previously provided in response to AG-7-10 and AG-7-11, respectively. These schedules will be the source and linked documents for the rate adjustment table set out in § 11.0 of Schedule JAF-2-8.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-4 Refer to Exh. BSG/JAF-2, at 24. Please explain how the adjustment for energy efficiency savings in the annual base rate adjustment mechanism ("ABRAM") " is consistent with the Department's precedent regarding Lost Base Revenues ("LBR") associated with demand-side management programs..."

Response: Please see Bay State's responses to DTE-12-5, DTE-12-6 and DTE-12-7.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-5 Refer to Exh. BSG/JAF-2, at 30. Please explain what the Company means by "LBR recovery is allowed if the impact on throughput and revenues is both substantial and quantifiable." Specifically, explain the meaning of the word "substantial" as used here.

Response: Mr. Ferro was referring to the Department's long-standing policy with respect to LBR recovery. See, for example, D.P.U. 89-260 at 104. Mr. Ferro has interpreted the Department's policy with respect to LBR recovery to mean that an adjustment to recover a de minimis or insignificant level of LBR would not be allowed.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-6 Refer to Exh. BSG/JAF-2, at 30. Please explain why "[f]ailure to adjust for energy efficiency savings in conjunction with an indexed based PBR mechanism would perpetuate under-earning by the Company" if, as the Company has stated, the Department has allowed Bay State "to collect LBR via a separate factor that is a component of the LDAC."

Response: As stated by Mr. Ferro at page 30, lines 19-20 of Exhibit BSG/JAF-2, Bay State would forgo collection of LBR through the LDAC while the ABRAM is effective. Instead of LBR recovery through the LDAC, Bay State proposes to integrate the recovery of the base rate impact of LBR with the ABRAM mechanism, which adjusts base rates each year for the PBR and SIR programs. Bay State believes that this approach streamlines the regulatory process associated with LBR recovery. Therefore, Mr. Ferro's statement that failure to adjust for energy efficiency savings through the ABRAM would perpetuate under-earnings is true.

Absent a provision to adjust for energy efficiency savings through the ABRAM, the Company would need the current LBR recovery mechanism through the LDAC in order to be sufficiently compensated for the base revenue loss as a result of the reduced therm throughput associated with the installment of energy efficiency measures. The Company's proposed energy efficiency adjustment through the ABRAM does not compensate for lost base revenue to the same extent as does the current LBR recovery mechanism. The Company's proposed ABRAM does not attempt to capture the following components of LBR that are recovered through the existing LDAC recovery mechanism:

- Any LBR experienced in the Prior Year is not recovered. The impact of the measure will only be recovered in the "rate year" (November – October), which begins a minimum of 10 months and up to 22 months after the installation of the measure. LBR experienced during this lag is not recovered, not are any carrying costs associated with this lag of recovered.
- Any installed measures not recorded for the Prior Year by the time the Company has filed its annual base rate adjustment (by June 1) will not be captured in future years because, as specified in the ABRAM, only measures installed in the Prior Year will be used to adjust base rates.

Nonetheless, the Company is proposing to adjust base rates for energy efficiency therm savings through the proposed ABRAM to streamline the regulatory process of adjusting rates as well as to eliminate the relatively complex process of LBR calculations.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-7 Refer to Exh. BSG/JAF-2, at 30, 33 and Sch. JAF-2-8, at 10. Please:
(a) explain how integrating the LBR recovery with the PBR rate adjustment will facilitate the Department's review of the Company's LBR filings in view of the time that is required to review such filings;
(b) explain how the LBR recovery mechanism as proposed here conforms to the Rolling Period Method "RPM" approved by the Department. Specifically, illustrate, with examples, how the therms savings, the LBR, and any carrying costs will be calculated under the Company's proposal.

Response: (a) Bay State's proposal in this proceeding limits the regulatory burden associated with approving the recovery of LBR to simply reviewing the Company's calculations of energy efficiency savings by Rate Schedule. There are no lost revenue or carrying cost calculations to review and approve. Therefore, the Company believes that the five-month timeframe between the Company's annual PBR filing on June 1st and the implementation date of November 1st is adequate to complete the Department's review.

(b) The Rolling Period Method allows utilities to recover LBR associated with energy efficiency measures for a period of time equal to the average time-span between each of its last four rate cases. An important reason that the Department established this method in D.P.U. 94-4-CC, was to ensure that utilities had proper incentives to reduce costs and achieve operational efficiencies. The Company's proposed PBR and the associated consumer dividend explicitly provide the very same long-run incentives that the rolling period method seeks to achieve. Therefore, the Company's alternative recommendation to adjust the billing determinants utilized in the PBR rate adjustments each year to reflect energy efficiency savings is not inconsistent with the Department's policy regarding LBR.

Further, in establishing the RPM in D.T.E. 97-112, Colonial Gas Company (1999), the Department found a rolling period equal to the average historic time span between a company's last four rate cases to be an appropriate span over which LBR cost recovery may be allowed because it "provides a reasonable approximation of a company's costs that would be sought in a rate case proceeding" associated with LBR. Id., at 32. Since the Company is proposing to replace the LBR-RPM recovery mechanism with an adjustment to

annual base rates during its PBR rate plan, such a base rate adjustment is part of the alternative to a rate case proceeding, and thus, is precisely, rather than approximately, the level of costs sought in its rate case proceeding. While, through the current LBR recovery mechanism, cumulative LBR is limited to the RPM average number of years between the last four rate cases, the Company's proposal through its ABRAM simply is adjusting its most current "test year" (Prior Year) revenues through a rate adjustment reflecting that year's annual energy efficiency therm savings. Please note that, if the Company were to continue with the LBR-RPM recovery mechanism through the LDAC, at the conclusion of this proceeding the Company's RPM number of years of installed measures to include would be seven (7); the average of the time between the last 4 rate cases ([6 + 3 + 13]/3 =>1983 to 1989 = 6; 1989 to 1992 = 3; and 1992 to 2005 = 13). The seven-year period is longer than the Company's proposed 5-year PBR plan.

Please see the response to AG-9-20 for an illustrative calculation of therm savings by Rate Schedule. The therm savings by Rate Schedule are reflected as an adjustment to base rates consistent with the illustrative calculations provided at Exhibit BGS/JAF-2, Schedule JAF-9. There are no lost base revenue or carrying cost calculations under the Company's proposal.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-8 Refer to Exh. BSG/JAF-2, at 26, 28 and Sch. BSG/JAF-2-9. How different is the gas industry price input inflation factor used in the illustrative rate calculation of the ABRAM shown in Sch. BSG/JAF-2-9 different from the GDP-PI price inflation index in the Company's price-cap formula?

Response: The price index formula Bay State proposes is calculated by subtracting an X factor from GDP-PI. As explained by Mr. Kaufmann on page 4 of Exhibit BSG/LRK-1, the X factor is comprised of three components: (1) the productivity differential between the gas distribution industry and the United States economy, (2) the inflation differential between the gas distribution industry and the United States economy, and (3) the consumer dividend. The price index formula is reflected in Section 7.3 of the proposed ABRAM tariff provided as Exhibit BSG/JAF-2 Schedule 2-8.

The phrase "rate of input price inflation representative of the gas industry" contained in Mr. Ferro's testimony refers to the GDP-PI minus the inflation differential component of the X factor. Mr. Ferro intended to describe the price index formula consistent with that presented in Section 7.3 of the proposed ABRAM tariff. For the purpose of clarifying his testimony at page 26, lines 11 and 12, and page 28, lines 15 and 16, of Exhibit BSG/JAF-2, the price index formula should be referred to as "gross domestic product price inflation less an X factor that represents productivity improvements, inflation differential and a consumer dividend".

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-12 Refer to Exh. BSG/JAF-2, Sch. JAF-2-8, at 6. Please explain how the PBR price cap adjustment formula in Exh. BSG/JAF-2-8, at 6 differs from the following price cap adjustment formula approved for Boston Gas Company in D.P.U. 96-50, at 261 (see also, D.T.E. 03-40, at 438, n. 188). P(t) # P(t-1) * (1 + I(t) - X ± Z(t)) where P(t) is the Company's weighted average price in year (t); I(t) is a price inflation index for year (t); X is a productivity offset that would remain constant throughout the term of the PBR plan; and Z(t) is an adjustment for exogenous costs that might occur in year (t). Specifically, establish a one-to-one correspondence between the components of the two formulae, and indicate any differences in the definition and measurement of the various components.

Response: The PBR mechanism proposed by Bay State mirrors that approved by the Department for Boston Gas in D.P.U. 96-50 and D.T.E. 03-40. Further, the PBR price cap formula established in the proposed tariff at Exhibit BSG/JAF-2-8 at 6 is calculated in the same manner as that set forth in D.T.E. 03-40 at 438, n. 188.

The price cap formula set forth at D.T.E. 03-40 at 438, n. 188 is algebraically equivalent to that proposed by Bay State. Specifically,

$$P_t \leq P_{t-1} * (1 + I_t + X \pm Z_t)$$

yields the following when both sides of the equation are divided by P_{t-1}:

$$P_t / P_{t-1} \leq (1 + I_t + X \pm Z_t)$$

which yields the price cap formula set forth in Bay State's filing when one (1) is subtracted from both sides of the equation:

$$(P_t / P_{t-1}) - 1 \leq (I_t + X \pm Z_t)$$

The correspondence for each of the variables is established in the following table:

D.T.E. 03-40 at 438, n. 188		Exhibit BSG/JAF-2-8 at 6
$(P_t / P_{t-1}) - 1$	=	PBR_CAP_T
I_t	=	$GDPPI_{T-1}$
X	=	X
Z_t	=	$Z_{REV} / (BASE\_REV_{T-1} - SIR\_REV_{T-1})$

.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-13 Refer to Exh. BSG/JAF-2, Sch. JAF-2-8, at 9. Please explain what the Company means by the statement: "[t]he maximum percentage change to any individual Base Rate Element pursuant to the PBR mechanism shall be the sum of the PBR Price Cap Adjustment and the X factor." How different is "the PBR Price Cap Adjustment" from the "X factor" as both are used here? Illustrate in algebraic terms if appropriate.

Response: Bay State is proposing to retain limited discretion in the allocation of the price cap change to the base rate elements for each customer class in the same manner as approved by the Department for Boston Gas in D.T.E. 03-40. Bay State's discretion would be limited in that it would not be permitted to increase any single rate component by more than the rate of inflation. The sum of the PBR Price Cap Adjustment and the X factor is equal to GDP-PI (assuming there are no Z factor adjustments), which is the same maximum change permitted by the Department in D.T.E. 03-40.

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Date: June 23, 2005

Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-12-14 Refer to Exh. BSG/JAF-2, Sch. JAF-2-8, at 11. Please:
(a) indicate the units of measurement for each of the components of the energy efficiency adjustment factor formula;
(b) explain whether it is theoretically possible for the denominator ($BD^{n,e}$ - $EE^{n,e}$) to take a value equal to zero;
(c) explain the reason for subtracting one (1) from the right-hand-side of the energy efficiency adjustment factor formula;
(d) explain how carrying costs associated with LBR recovery are reflected in the energy efficiency adjustment factor formula.

Response: (a) The units of measurement for each of the components of the energy efficiency adjustment factor formula are as follows:

$EE\_ADJ_T^{n,e}$	The Energy Efficiency Adjustment Percentage for Base Rate Element *e* applicable to Rate Schedule *n* for the Rate Year. **Units of Measure: Percentage.**
$BD^{n,e}$	The most recent Calendar Year weather-normalized billing determinants corresponding to Base Rate Element *e* applicable to Rate Schedule *n.* **Units of Measure: therms.**
$EE^{n,e}$	The annualized Energy Efficiency savings for the most recent Calendar Year associated with Base Rate Element *e* applicable to Rate Schedule *n.* **Units of Measure: therms.**

(b) It is not theoretically possible for the annualized energy efficiency savings to equal the weather normalized sales because this would indicate that the Company had no throughput for the year for the corresponding Rate Class. Further, none of the Department-approved energy efficiency measures completely eliminate gas usage upon installation.

(c) The calculated energy efficiency adjustment percentage that results from the application of the formula set forth on Exhibit BSG/JAF-2 at 11 is carried forward to Exhibit BSG/JAF-2, page 14, Column G. One

is added to Column G in order to calculate the Total Base Rate (rather than an adjustment to a base rate) as indicated in Column I.

(d) The Company would not recover any carrying costs under its proposal to integrate the recovery of LBR with its proposed PBR mechanism. See also response to DTE-12-6.

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RESPONSE OF BAY STATE GAS COMPANY TO THE
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Date: June 23, 2005

Responsible: Paul R. Moul, Consultant (ROE)

DTE 13-7 Refer to Exh. BSG/PRM-1, at 8. Please explain how the Company will attempt to "rebalance" its rates to reflect the cost of providing service to smaller, lower load customers. Provide any materials, studies, and/or analyses that the Company plans to use in order to conduct this process.

Response: In response to the market factors, the Company will attempt to "rebalance" its rates that generally reflect lower rates charged to large, high load factor customers and correspondingly raise rates to small, low load factor customers. This strategy is necessary to remain competitive in the high load factor market and to recover all its costs. Any loss of revenues from large, high load factor customers would result in the need to recover more costs from the small, low load factor customers.

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Date: June 23, 2005

Responsible: Paul R. Moul, Consultant (ROE)

DTE 13-8 Refer to Exh. BSG/PRM-1, at 8. Please explain in detail how the Company has been proactive to the threat of bypass by working with its customers that are in close proximity to interstate pipelines. Provide any materials, studies, and/or analyses used by the Company to mitigate the threat of bypass.

Response: The Company has entered into special contracts over the years to avoid customers bypassing its distribution system. The Company entered into at least two such special contracts to avoid bypass. These two contracts were with Wyeth Pharmaceuticals, filed by the Company on July 28, 2003, docketed as GC-03-14 and approved by the Department on September 8, 2003; and Massachusetts Municipal Wholesale Electric Company ("MMWEC") filed by the Company on December 31, 1999, docketed as D.T.E. GC-99-43 and approved by the Department on March 24, 2000.

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Responsible: Paul R. Moul, Consultant (ROE)

DTE 13-9 Refer to Exh. BSG/PRM-1, at 8. Please explain any variance in risk associated with the threat of bypass of the Company to each company in the Gas Group.

Response: There is no significant variance in risk associated with the threat of bypass faced by the Company and the companies comprising the Gas Group. While the degree of that threat may vary, all of the companies in Mr. Moul's proxy group face some threat of bypass where large end users are in close proximity to the interstate pipelines. Indeed, where some states have attempted to outlaw bypass, those attempts have been overruled and the right of bypass has prevailed.

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Responsible: Paul R. Moul, Consultant (ROE)

DTE 13-10 Refer to Exh. BSG/PRM-1, at 8. Please explain any variance in risk associated with the load factor of the Company to each company in the Gas Group.

Response: Mr. Moul has not specifically compared the load factors of the Company to each company his Gas Group. Mr. Moul is aware of the relative composition of the customer mix of each company within his Gas Group, and he is mindful of the reality that typically residential customers have a low load factor.

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Responsible: Paul R. Moul, Consultant (ROE)

DTE 13-27 Refer to Exh. BSG/PRM-1, at 36 and Exh. BSG/PRM-1, Appendix C, at 1-2. Please provide a list of elements and/or types of risk by category of risk (financial risk and business risk.) Please provide any supporting documentation used to assemble this list.

Response: A discussion of these risk variables is provided in the attachment taken from Regulatory Finance Utilities' Cost of Capital, by Roger A. Morin. A relevant portion of text is provided at Attachment DTE-13-27.

REGULATORY FINANCE

UTILITIES' COST OF CAPITAL

Roger A. Morin

Incorporated

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Interest Rate Risk (i)

To the nominal rate is added a risk premium to compensate investors for uncertainty about future real rates of return and inflation rates. Interest-rate risk refers to the variability in return caused by subsequent changes in the level of interest rates. It stems from two sources. The first source is the uncertainty regarding the rate at which interest or dividend receipts can be reinvested. In the case of a bond, for example, the holding period return will be largely dictated by the rate at which the periodic interest coupons can be reinvested, and the greater the uncertainty of future interest rates, the greater is the reinvestment risk.

The second source of interest rate risk stems from the negative relationship between interest rates and value. When interest rates rise, a previously issued bond paying a fixed contractual return will become a less desirable investment, falling in price. This is because any change in the bond's required return can only be accomplished through a capital loss, since the bond's contractually fixed interest payments do not vary over its life. If an investor decides to sell the bond before maturity, the price that someone else is willing to pay will depend on prevailing interest rates at that time. If, for example, prevailing interest rates are at 12%, a bond yielding 10% on its face value will be worth less than the 12% bonds currently available in the market. The entire process works in reverse as well. Fixed income contracts increase in value as interest rates decline. Stock prices, particularly those of high-yielding public utilities, are also influenced by fluctuations in prevailing interest rates on alternative competing investments, since the dividends derived from ownership of stocks compete with the coupon interest payments from bonds.

The first three components of required return discussed thus far reflect broad economic forces outside a firm's control and systematically affect all firms. The remaining components of risk are specific to a particular company.

Business Risk (b)

The fourth component of return is the business risk perceived by investors. Business risk encompasses all the operating factors that collectively increase the probability that expected future income flows accruing to investors may not be realized, because of the fundamental nature of the firm's business.

Business risk is due to sales volatility and operating leverage. Sales volatility, also referred to as demand risk, refers to the uncertainty in the demand for the firm's products due in part to external non-controllable factors, such as the basic cyclicality of the firm's products, the products income and price elasticity, the amount of competition, the availability of

product substitutes, the risk of technological obsolescence, the degree of regulation, and the conditions of the labor and raw materials markets.

Sales volatility is also related to internal or controllable factors. The reaction of a firm's management to the business environment, such as the adoption of a particular cost structure, are important dimensions of business risk. If all production costs are variable, then operating income varies proportionately to sales variability. If, as is the case for utilities, a large portion of costs are fixed, then operating income will be far more volatile than sales. This magnification effect of fixed costs on the variability of operating income is referred to as "operating leverage."

The business risk of utilities is assessed by examining the strength of long-term demand for utility products and services. Many factors have an impact on business risk, including the size and growth rate of the market, the diversity of customer base and its economic solidity, the availability of substitutes and degree of competition, and the utility's relative competitive standing in its major markets, including residential, industrial, and commercial markets.

The regional economics of a utility's service territory exert a strong influence on the company's risk. The proportion of total revenues as between industrial, commercial, and residential customers measures a utility's dependence on any given class of customers. Within a given class, such as industrial, the concentration of revenues from the top five, ten, or twenty business customers is an additional measure of a company's vulnerability and exposure.

Diversification and flexibility in the fuel mix, and the dependability of fuel deliveries are examples of internal risk factors for electric utilities. Operating efficiency from the standpoint of cost and quality of service is another factor that may influence a utility's competitive risk exposure. Other examples of internal risk factors include the degree of diversification in the firm's asset structure, managerial efficiency, growth strategy, research and development policies, and competitive posture.

The impact of inflation on a specific company's sales, costs, profits, cash flows, prices, and the firm's response to such inflationary conditions are also part of the firm's business risk. The size of a utility's construction program is also a source of business risk, to the extent that new construction is to meet projected demand. In addition, projected demand is more difficult to forecast than existing demand, and this forecasting risk is compounded by regulatory lag and attrition. Construction factors also impinge on financial risk, as discussed below.

A regulated utility is also subject to forecasting risk to the extent that budgeted forecasts are made one to two years before regulatory determination of its rates. Potential deviations from expected profitability can occur because of unanticipated increases in costs (interest, O&M, etc.) and/or unanticipated decreases in revenues. Any factor that complicates the investor's ability to assess future prospects will accentuate business risk.

Business risk manifests itself not only through demand uncertainties but also through supply uncertainties. An illustrative case in point is the supply risks of local gas distribution companies (LDCs) that followed the 1986 deregulation of natural gas prices. These companies became responsible for making decisions regarding prices, contract differentiation, and supply portfolio composition. The provision of gas supplies to its customers was therefore subject to greater risk of approval by the regulators. The uncertain and evolving roles of LDCs in providing gas supplies to various customer groups who have several supply alternatives in a deregulated market complicated the decision process. Moreover, deregulation brought with it greater ability for producers and other natural gas marketers to sell within the service area of LDCs, creating great uncertainty as to the size of market to be supplied. This risk and the reliance upon other parties for the security of supply and supply planning created a radically different supply risk for LDCs under deregulation.

Short- v. Long-Term Business Risk. A further distinction is frequently made between short-term and long-term business risks. Short-term business risks involve short-term uncertainties and volatilities that are expected to occur within one year. They are usually business-cycle related. Long-term business risks are longer-term uncertainties over and above short-term risks that involve changes in the structural and chronic supply/demand forces in a given industry. Examples of the latter include the gradual penetration of competitive forces and/or deregulation in a given industry, the emergence of technology-based growth opportunities in an industry, impending environmental legislation and its impact, and the gradual transition to different modes of regulation.

Regulatory Risk. Regulation for public utilities is a major component of business risk because of its impact on revenues and earnings. Decisions of state regulators and federal regulatory agencies, such as the Environmental Protection Agency, the Nuclear Regulatory Commission, the Energy Planning Board, and others, have a direct impact on utility finances. Regulation can increase business risk if it does not provide adequate returns and/or if it does not provide the utility with the opportunity to earn a fair rate of return.

The Supreme Court's recent opinion in *Duquesne Light Co. et al. v. Barasch et al.* (109 S. Ct. 609, 1989) addressed a number of issues relating to regulatory

practices and established that regulatory risk is a special class of risk that must be recognized by regulators when setting the allowed rate of return.[1]

Regulatory risk generally refers to the quality and consistency of regulation applied to a given regulated utility, and specifically to the fairness and reasonableness of rate awards. Regulatory jurisdictions are evaluated on the basis of three major factors: earnable return on equity, regulatory quality, and regulatory technique. In assessing these three factors, several issues must be examined, including the length of regulatory lag, the inclusion or exclusion of construction work in process (CWIP), the type of test year employed (whether historical or forward), the normalization of tax timing differences versus flow-through techniques, the proportion of earnings represented by the allowance for funds used during construction (AFUDC), environmental issues, and judicial and legislative mandates.

Regulation can compound the business risk premium if it is unpredictable in reacting to rate hike requests both in terms of the time lag of its response and its magnitude. For example, the absence of a purchased gas adjustment mechanism injects regulatory lag. More generally, if the regulatory response to rising operating costs and higher capital costs because of high unanticipated inflation is inadequate or untimely, or if the utility is not given the opportunity to cover higher costs because of political factors or inadequate regulation (rate base exclusions, disallowances), the business risk premium rises further, along with capital costs.

Regulation can also diminish business risk. Bonded rate increases, adoption of forward test years, the use of deferral and normalization accounts and automatic adjustment mechanisms, such as fuel adjustment clauses, are examples of attempts to lower regulatory risk.

Unreasonable rate treatment for any utility can not only raise the cost of capital and, hence, ratepayer burden, but may also have serious public policy implications and repercussions for the entire business or economic region. When adhering to questionable implementations of a given methodology, or when ignoring relevant evidence, a regulatory body runs the risk of ignoring the policy implications of a recommendation. For example, the quality of regulation and the reasonableness of rate of return awards clearly have implications for regulatory climate, economic development, and job creation in a given territory. Fair and reasonable regulation must be consistent with the economic well-being of the area served.

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[1] See Kolbe and Tye (1992) for a further discussion of this issue.

Regulatory lag is an important determinant of regulatory risk. Its presence makes it difficult to earn a reasonable rate of return, especially in an inflationary environment. Moreover, regulatory lag limits the pricing flexibility of the utility, and the company may be unable to respond to competitive pressures. It also creates mismatches between regulatory rates and supply-demand costs so that prices are either too high or too low. Inefficient resource allocation and distorted consumer pricing signals may result.

Incentives to innovate and to introduce new services may be dampened due to regulatory lag to the extent that the utility is unable to capture the cost savings of its innovations. Frequently, the payoff of its innovations and efficiency gains are asymmetric; cost savings from successful innovations are passed on to ratepayers, while unsuccessful ventures are disallowed and absorbed by investors. The net result is that utilities may use capital/labor ratios that are not cost-minimizing.

Several environmental issues increase regulatory risks and create the need for non-revenue producing investments. For example, in the 1990s, the financial effects of the Clean Air Act on coal-fired generation plants is a source of cost and availability uncertainty for electric utilities with fossil electric generating units. Consumer resistance to distribution/transmission site noise level, appearance, and the spectre of electro-magnetic fields (EMF) result in increased costs and construction delays. Another example is the uncertain final financial effects of the Safe Drinking Water Act on water utilities. Water utility companies will need to upgrade their facilities to comply with evolving environmental standards. Because the standards are still evolving and are yet to be determined, there are uncertainties related to upgrading and compliance costs. Future water quality regulations will increase retail water utility fixed costs and capital investment. This will in turn increase operating and financial leverage, thus increasing risk and required rate of return.[2]

Financial Risk (f)

Financial risk stems from the method used by the firm to finance its investments and is reflected in its capital structure. It refers to the additional variability imparted to income available to common shareholders by the employment of fixed-cost financing, that is, debt and preferred

[2] For a complete study of how changes in the operating environment of water utilities have increased their investment risk and their cost of capital, both in absolute terms and in relation to other utilities, and how increased capital and operating costs of complying with new and evolving water quality standards have an impact on their risk and required rate of return, see Morin (1992).

stock capital. Although the use of fixed-cost capital can offer financial advantages through the possibility of leverage of earnings (financial leverage), it creates additional risk due to the fixed contractual obligations associated with such capital. Debt and preferred stock carry fixed charge burdens that must be supported by the company's earnings before any return can be made available to the common shareholder. The greater the

EXAMPLE 2–2

One of the most important ideas in finance is that financial risk increases with leverage and that the greater the leverage, the greater the cost of equity. For example, consider a company with a total capitalization of $600,000. The company can be either financed entirely through common equity contributed by the shareholders, or by issuing $300,000 of debt at a 10% rate of interest and having an equity investment of just $300,000. The expected earnings before interest and taxes (EBIT) are $100,000. The financial results obtained for the two alternative capital structures are shown in Table 2-1 below for three assumed levels of EBIT, $80,000, $100,000, and $120,000.

TABLE 2-1
DEMONSTRATION OF THE IMPACT OF LEVERAGE ON EQUITY RETURNS

	All Equity ($000)			50% Debt ($000)		
EBIT	$80	$100	$120	$80	$100	$120
Interest	0	0	0	30	30	30
Profit before Taxes	80	100	120	50	70	90
Taxes (50%)	40	50	60	25	35	45
Profit after Taxes	40	50	60	25	35	45
Return on Equity	40/600	50/600	60/600	25/300	35/300	45/300
	6.7%	8.3%	10%	8.3%	11.7%	15%

At an EBIT level of $100,000, the use of debt financing has increased the return on equity from 8.3% to 11.7%. The shareholders' gain is the result of raising funds on the debt market at an after-tax cost of 5% and investing these funds to yield a return well in excess of that cost. But the risk to the shareholders is

increased. The earnings available to common shareholders become more volatile, as the relative amount of debt used becomes greater. Leverage is a double-edged sword. Just as shareholders' gains are magnified in the case of favorable operating results, potential losses are also magnified in the case of unfavorable results. In this example, the consequences to the shareholders of a 20% variation in Earnings Before Interest and Taxes in either direction are calculated. The return on equity figures of Table 2-1 can be summarized as follows:

Operating Results	Equity Financing	50% Debt Financing
$ 80,00	6.7%	8.3%
$100,000	8.3% 1	1.7%
$120,000	10.0%	15.0%

It is clear from these results that variations in operating earnings cause magnified variations in equity returns when debt financing is used. The spread in equity returns is wider in the case of debt financing, and the greater the leverage, the greater the spread and the greater the cost of common equity.

percentage of fixed charges to the total income of the company, the greater the financial risk. The use of fixed cost financing introduces additional variability into the pattern of net earnings over and above that already conferred by business risk, and may even introduce the possibility of default and bankruptcy in unusual cases.

Prudent management requires that lower financial risks should be used to offset high business risks. Industries with significant variability in revenues (durables, auto, capital goods) generally have low debt ratios to offset the higher business risk. The converse is also true.

More generally, a financial risk premium is required by both bondholders and common shareholders. Common equity holders require compensation for the additional magnification induced in their future earnings, while bondholders require compensation for the greater risk of default. A formal analytical expression for the required return on levered common equity is derived in Chapter 17, showing the profound effect of the variability introduced to the firm's income stream by senior fixed charges on the

market valuation of common stock. The expression linking equity returns and capital structure is as follows:

$$r = [R + (R - K_d)D/E](1 - t) \quad (2\text{-}3)$$

where
- r = rate of return on common equity
- R = rate of return on total assets
- K_d = interest rate on debt
- D/E = debt to common equity proportion
- t = income tax rate

In words, this expression states that the return on the book value of equity is directly proportional to the rate of return on assets, plus a risk premium equal to the excess of the asset rate over the debt rate levered by the debt/equity ratio in book value terms. A given variation in R due to business risk is magnified into a larger variation in the return on equity, r; the greater the relative proportion of debt, D/E, the greater is the magnification effect.

Although financial risk is unique to a specific firm and is distinct from the firm's business risk, business and financial risk are interrelated. The overall risk to the common stock investor is a composite of the business and financial risk. The overall risk of two firms may be similar when a high business risk firm has assumed less financial risk while a low business risk firm has assumed greater financial risk. In general, unregulated companies have greater business risk than regulated utilities, and because of these differences in business risk, utilities have adopted a correspondingly higher amount of financial risk in their capital structures.

Finally, it should be noted that financial risk can arise not only because of variations in capital structure, but also because of the use of financing methods that impart some unpredictability to future earnings. The presence of convertible bonds or convertible preferred shares, or the presence of securities issued with warrants attached create uncertainty as to the exact time at which the rights of those securities will be exercised and as to the impending dilution in earnings per share.

Construction Risk. Construction risk is an important component of financial risk. If a company has a large construction budget in relation to its size, that company requires substantial external financing in the immediate future. It is imperative that the company has access to needed capital funds on reasonable terms and conditions. A regulated utility is even more susceptible to construction risk than an unregulated company. An unregulated company has more discretion and latitude in scheduling and deferring capital projects. A utility, because of its mandated obligation

to serve, does not possess the same flexibility. The problem is compounded for a regulated company that must secure funds from capital markets in order to fund new construction commitments, irrespective of capital market conditions, interest rates conditions, and quality consciousness of market participants.

On debt markets, construction is one of several key determinants of credit quality and, hence, of capital costs. A company's future construction plans are scrutinized by bond rating agencies before assessing credit quality. The construction budget in relation to internal cash generation is a key quantitative determinant of credit quality, along with construction expenditures as a proportion of capitalization. CWIP to capitalization and common equity ratios are also analyzed by investors and become key determinants of capital costs and funds availability.

Moreover, if a utility has an impending large construction program, rate relief requirements and regulatory treatment uncertainty will increase regulatory risks as well, lowering credit quality. Regulatory risks stemming from a substantial construction program include approval risks, lags and delays, potential rate base exclusions, and potential disallowances.

Liquidity Risk (l)

The ability to buy or sell an investment quickly and without a substantial price concession is referred to as liquidity. Liquidity risk represents the possibility of sustaining a loss from current value when converting an asset into cash. Securities listed on the New York Stock Exchange are highly liquid, whereas the shares of over-the-counter companies are less marketable. Closely-held securities possess very little liquidity.

Size Effect. Liquidity risk is likely to be size-related. Investment risk increases as company size diminishes, all else remaining constant. The size phenomenon is well documented in the finance literature. The size effect is most likely the result of a liquidity premium, whereby investors in small stocks demand greater returns as compensation for lack of marketability and liquidity. Investors prefer high to low liquidity and demand higher returns from less liquid investments, holding other factors constant. The size effect is discussed further in Chapter 13.

In summary, required return on investment is determined by the nominal risk-free rate and a risk premium. The risk-free rate is driven by expected inflation and by variations in the real rate of interest. The latter is determined by investors' time preference for consumption, by the availability of investment opportunities in the economy, and by the demand and supply for funds, largely influenced by fiscal and monetary policy.

These factors are systematic in that they affect all securities. The risk premium is affected by business, financial, and liquidity risk. The role of regulatory risk is in turn crucial in determining the level of business risk. Construction risk also influences the degree of financial risk.

2.2 The Concept of Risk

The *Hope* case strongly suggested that a fair return should be commensurate with the returns earned by other firms with corresponding risks. Hence, the proper measure(s) of risk to be used in regulatory proceedings is crucial in setting a fair return for public utilities. The previous section identified the various risk components that determine the required return on a security. This section addresses the actual measurement of risk by investors.

The appropriate measure of risk in regulatory proceedings depends on the framework in which investors view risk. There are two general frameworks within which the measurement of risk can be approached:

1. Firm-specific risk
2. Portfolio risk

The firm-specific viewpoint considers the risk of a security as if that security were viewed in isolation by the investor and envisages risk as the total variability of its returns. In contrast, the portfolio viewpoint considers the risk of a security in the context of a diversified portfolio and envisages risk as only that portion of the security's total risk that cannot be diversified away by the investor. Which is the predominant viewpoint is an empirical question.

In a comprehensive study of individual investors' behavior, Blume and Friend (1978) found that when purchasing stock, 82% of all stockholders evaluate both the risk involved and the potential return. The three most commonly used measures of risk by these investors are price volatility (standard deviation), earnings volatility, and published beta coefficients. The first two measures of risk are consistent with the total variability (firm-specific) framework, and the third measure is consistent with the portfolio framework. In a survey of 210 investment bankers regarding methods employed by them to assess utility risk, Chandrasekaran and Dukes (1981) found that beta was the most popular, followed by standard deviation, coefficient of variation, and skewness. In a study of 165 public utility firms and public utility commissions, Dukes and Chandy (1983) found that beta was the risk measure most used by 65% of the utilities and 82% of the commissions. The standard deviation was used by 14% of the utilities and 42% of the commissions. Both frameworks are thus relevant.

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RESPONSE OF BAY STATE GAS COMPANY TO THE
FOURTEENTH SET OF INFORMATION REQUESTS FROM THE D.T.E.
D. T. E. 05-27

Date: June 23, 2005

Responsible: John E. Skirtich, Consultant (Revenue Requirements)

DTE-14-3 Refer to Exhs. BSG/JES-1, at 31; and the Company's response to AG-1-74. On page 31 of Exh. BSG/JES-1, Mr. Skirtich states: "...an adjustment was made to the amount of the NCSC charges allocated to Bay State...." In his response to AG-1-74, dated May 20, 2005, Mr. Skirtich states: "Donations made by NiSource Inc. are not allocated to Bay State." Please reconcile these statements.

Response: NiSource, Inc., the parent company of Bay State Gas Company ("Bay State"), makes charitable contributions. The charitable contributions made by the parent, NiSource, are not allocated to any of the operating companies.

NiSource Corporate Services Company ("NCSC), a separate corporate subsidiary and service company affiliate of Bay State, also makes its own charitable contributions. Its costs are allocated to other companies in the system that it provides services to, just as any other cost of doing business. However, the test year charitable contributions allocated to Bay State have been eliminated from the cost of service for ratemaking purposes, as explained at Exh. BSG/JES-1 at 31.

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RESPONSE OF BAY STATE GAS COMPANY TO THE
FIFTEENTH SET OF INFORMATION REQUESTS FROM THE D.T.E.
D. T. E. 05-27

Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-19 Refer to the Company's response to the Department's information request DTE 4-1. Please:

(a) discuss the differences, if any, in the definition and measurement of O&M expenses between the Boston Gas cost trend analysis in D.T.E. 03-40 and the Bay State cost trend analysis in the instant proceeding.
(b) discuss the comparability of the results of the two studies given any differences in the definition and measurement of O&M expenses between the two studies;
(c) explain why the Company eliminated pensions, transmission and storage O&M expenses from the Bay State econometric cost study when these costs were included in the Boston Gas econometric cost study in D.T.E. 03-40;
(d) explain why the Company did not include a "rate-freeze dummy" in the Bay State econometric cost model to estimate the independent effect of the rate-freeze on the Company's O&M costs similar to the "PBR dummy" in the Boston Gas econometric cost model.

Response:

(a) There are no known differences between the definition and measurement of O&M expenses in the Boston Gas and Bay State cost trend analyses.

(b) Given the answer to (a), I believe the cost trend analyses are comparable for Boston Gas and Bay State.

(c) Pensions were eliminated from O&M costs in the Bay State econometric study because these expenses are volatile, largely beyond the control of utility managers and, as approved in DTE 03-40 and proposed by Bay State in this proceeding, not subject to the PBR mechanism. Transmission and storage expenses were eliminated from O&M expenses in order to respond to the Department's comments in DTE 03-40, where one of the concerns noted for the econometric cost model was that "the cost study did not distinguish between distribution and non-distribution labor and O&M expenses, but assumed that all costs were distribution costs" (DTE 03-40 at 485).

(d) The econometric cost model did not include a "rate freeze dummy" because this variable was not statistically significant.

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-20 Refer to the Company's response to the Department's information request DTE-4-2. Please:

(a) discuss whether the inclusion of the "system age" proxy in Bay State's econometric cost study (with total costs as the dependent variable) would have addressed the Department's concerns with capital "vintaging" in D.T.E. 03-40;
(b) indicate how the Company captured efficiencies from economies of scale while not including capital cost in the econometric study.

Response:

a) The system age proxy was not specifically designed to address the Department's concerns with capital "vintaging" in DTE 03-40, which pertained to the measurement of capital cost *per se*. In DTE 03-40, the Department wrote that "to demonstrate that there was no systematic bias in the *capital cost measure* (emphasis added) due to age differences in utility plants across the country in 1983, Boston Gas should have shown that the difference in the average age of plants in the Northeast and the average age of plants in the rest of the country in 1983 was not statistically significant" (DTE 03-40 at 484). In this passage, the Department is clearly expressing concerns about how capital costs themselves are measured. Addressing these concerns would require data on the average age of plant for distributors in the Northeast and the rest of the country in 1983.

In my work for Bay State, I undertook extensive examination on the data that exists on average plant age. I also attempted to control for differences in plant vintage using information on population and gas distribution customers, mapped to distributors' service territories, in every year since 1900. These exercises led me to conclude that sufficient data are not available to satisfy the standard the Department expressed in DTE 03-40 for addressing its capital vintaging concerns. This was, in fact, a principle reason that I chose to eliminate capital costs from the cost measure when undertaking the econometric study for Bay State.

But while it is not possible to measure and control for differences in plant age perfectly across distributors, it is possible to develop reasonable proxy measures that reflect differences in the age of gas

distribution plant. The system age proxy used in our model is such a proxy. Since new distribution plant is primarily linked to serving new customers, the ratio of customers added in the last 10 years to total customers will reflect the relative age of plant, and differences in this ratio will reflect differences in distributors' relative plant ages. This metric can also be computed straightforwardly for most distributors.

Therefore, while the system age proxy used in the Bay State study does not address the capital vintaging concerns expressed in DTE 03-40 perfectly, it is important to keep two points in mind when interpreting this variable in the present study. First, the concerns expressed by the Department in DTE 03-40 apply directly to capital costs and are thus greatly attenuated in the Bay State study, which applies only to O&M costs. Second, I do not believe that sufficient data exist to satisfy the standard expressed in DTE 03-40, but the current system age proxy is a practical metric that still reflects differences in plant age across distributors.

(b) Economies of scale can be reflected in O&M as well as capital costs. Our study captures efficiencies related to economies of scale by including quadratic and interaction terms for each of the outputs (customer numbers and volumes).

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-21 Refer to the Company's response to the Department's information request DTE 4-5. The Company stated that an econometric specification that included a separate time trend variable for Bay State Gas for the rate freeze years was first included and that the variable was eventually excluded because its coefficient was found statistically insignificant. Please:

(a) indicate why the Company tried to capture the effects of Bay State' rate freeze using a trend variable instead of a dummy variable;
(b) discuss the implication of finding the coefficient of the trend variable not statistically significant; could the Company conclude that the rate freeze period did not have a significant impact on the Company's O&M cost?

Response:

(a) The variable discussed in the response to DTE-4-5 is in fact a dummy variable for the rate freeze years.

(b) While the rate freeze, or dummy, variable for Bay State was not statistically significant, this does not necessarily imply that Bay State did not improve its O&M cost performance while subject to the rate freeze. Dummy variables can be useful in econometrics, but they are fairly "blunt instruments." In this instance, a dummy variable would correspond to a change in the intercept for Bay State's O&M cost function while it was under the rate freeze. It is possible that the efficiencies Bay State registered under the PBR plan would not be manifested as a lower, cost function intercept. If not, then the lack of statistical significance would not be surprising, nor would it indicate that the Company failed to achieve efficiencies under the rate freeze.

My conclusion that Bay State became more efficient under the rate freeze was based on several empirical analyses. One was the Company's cost trend analysis discussed in Exh. BSG/LRK-2. In addition, I used our econometric O&M cost model to examine the difference between Bay State's actual and predicted O&M cost for the pre-freeze, 1993-98 period. This analysis showed that Bay State's actual O&M costs were 1.7% below their predicted value in 1993-98, but this difference was not statistically significant. In contrast, Bay State's O&M costs were 14.4% below their predicted value in 1999-

2003, and the difference was statistically significant. This is further evidence that Bay State became a better O&M cost performer during the rate freeze period. I did not report the econometric cost results for the 1993-98 period because the cost trend analysis already focused on the *change* in the Company's cost performance and, to avoid potential confusion, I chose to evaluate the *level* of Bay State's O&M cost performance using the econometric model over the entire rate freeze period. Nevertheless, a comparison of the econometric results before and after the rate freeze period does support the conclusion that Bay State achieved cost efficiencies while under the rate freeze.

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-22 Refer to the Company's response to the Department's information request DTE 4-9. Please explain why the Company assumed that the error term has a t-distribution and not a normal distribution. Please discuss any differences, in terms of hypothesis testing found in assuming a t-student distribution and not a normal distribution for the error term.

Response: The standard assumption for the error term is that it is normally distributed with mean zero and standard deviation of σ. Our use of the t-distribution for the error term comes from the fact that the true standard deviation, σ, is unknown and must be estimated from the sample by *s.* The test-statistic used in hypothesis testing in this case has a t distribution. In any case, the t-distribution closely approximates the normal distribution for samples with 30 or more observations.

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-23 Refer to the Company's response to the Department's information request DTE 4-7. Please explain how the "system age" variable is a proxy for the fixed capital stock.

Response: The system age variable is a proxy for an important characteristic of the capital stock, which is its average age. This variable was designed to respond to the Department's main concern regarding capital vintaging expressed in DTE 03-40. While a direct measure of fixed capital could have been used as an independent variable in the short-run cost model, such a variable would have been subject to the same "vintaging" concerns noted in DTE-03-40. As discussed in the response to DTE-15-20, the data did not exist to address these concerns directly. The system age proxy was therefore designed to be responsive to the Department's concerns without having to rely on a capital stock measure that the Department has previously found lacking.

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-24 Refer to the Company's response to the Department's information request DTE 4-19:

(a) if the "the cost efficiency measure varies by firm *i* but not by time *t*" what is the rationale for proposing an index-based PBR plan for Bay State in the instant proceeding? Please explain how realistic is to assume that Bay State's efficiency with respect to the average has not changed over time;
(b) the Company stated that the pure random element of the composed error term is zero on average. In addition, the Company stated that the mean of the fitted residual is zero (see the Company's response to DTE 4-9). Please discuss the implication of these two assumptions on the expression depicted in the Department's information request DTE 4-19 (c). Would it be fair to assume that, on average $\text{lnefficieny}^{i} = \text{lnefficiency}^{average}$? Please explain why yes or why not.

Response:

(a) This statement is compatible with proposing an index-based PBR plan for Bay State. The assumption is that management efficiency is an unobservable input in the production process. Managerial efficiency can vary among firms in the industry so that, all else equal, more efficiently managed firms have lower costs. However, the efficiency of management is unlikely to fluctuate dramatically from year to year for a number of reasons, including the fact that managerial practices evolve slowly and there is often little turnover in managers from year to year. Consistent with these assumptions, our model evaluates the efficiency of any individual gas distributor's cost performance over a multi-year period.

It is possible, however, for a firm's average efficiency level to differ over two, separate multi-year periods. One way this can occur is through a regulatory "regime change" that creates stronger performance incentives than the previous regulatory regime. This is, in fact, the rationale for implementing performance-based regulation.

It would be expected that average efficiency is greater under PBR than under traditional cost of service regulation. One way this could be measured in our econometric model is by splitting the sample period into two separate sub-periods, and evaluating a company's

cost performance separately over those two sub-periods. As discussed in the response to DTE-15-21, I undertook this analysis for Bay State, and it supported the conclusion that Bay State became more efficient under the rate freeze. This analysis is consistent with the view that Bay State's efficiency has changed relative to the average in the industry and is also consistent with the assumptions underlying our econometric specification, which is that efficiency can only be evaluated over a multi-year period.

(b) The response to DTE-4-19 never says the mean of the fitted residual is zero, although it does say the pure random element of the composed error term has an expected value of zero. It is customary in econometric research for a "random" error term to have an expected value of zero.

(c) In any cross sectional sample of firms, the average inefficiency measured across the *i* firms in the sample will generally be equal to $inefficiency^{average}$. It should be noted, however, that our econometric model measures all firms' efficiency relative to $inefficiency^{average}$, and this latter expression is not measured directly.

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Date: June 23, 2005

Responsible: Lawrence R. Kaufmann, Consultant (PBR)

DTE-15-25 Refer to the Company's response to the Department's information request DTE 4-27. The Company states that "[t]his evidence further supports the conclusion that Bay State became very efficient under its previous PBR plan, so its consumer dividend should be no greater than the 0.3% approved for Boston Gas." Please provide the basis for the Company's conclusion given that the econometric cost study did not include a dummy variable to estimate the independent effect of the rate-freeze on Bay State's costs during the study period.

Response: Please see the response to DTE-15-21.

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Date: June 23, 2005

Responsible: Lawrence J. Kaufmann, Consultant (PBR)

DTE-15-26 Refer to the Company's response to the Department's information request DTE 4-38. Please discuss whether Boston Gas was operating under any type of incentive regulation or rate freeze plan prior to its initial rate-indexing PBR plan in D.P.U.96-50.

Response: I am not aware of Boston Gas's entire regulatory history before DPU 96-50. However, it is my understanding that Boston Gas was not subject to a comprehensive incentive plan prior to DPU 96-50 but had been operating under a non-core sales margin-sharing arrangement. In DPU 96-50, the Department "noted that margin sharing represents a targeted incentive of the type generally discouraged in Incentive Regulation" (DPU 94-58) and said "the Department has approved in this Order a broad-based incentive mechanism which is more consistent with the transition to a competitive marketplace than the targeted incentive mechanisms approved in both DPU 93-60 and DPU 93-141-A" (DPU 96-50 at 255) Both a comprehensive rate freeze and an index-based PBR mechanism are examples of broad-based PBR approaches that are distinct from the targeted, margin-sharing incentives referenced by the Department in DPU 96-50. It is also my understanding that, prior to the approval of DPU 96-50, Boston Gas had been applying for cost of service-based rate adjustments every two to three years.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-28 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 4, lines 62-63. Explain the derivation of the Winter and Summer "Customer Revenue" for the Special Contract customers.

Response: The Special Contract "Customer Revenue" on lines 62 (Winter) and line 63 (Summer) consists of the actual 2004 six months of demand charges from Special Contract Customer #1 and #5 and a monthly customer charge from Customer #2. For the winter period, the $1,673,238 represents $278,350 a month of actual demand charges and $523 a month of customer charges. For the summer period, the $1,700,847 reflects the same actual monthly demand and customer charges, plus a minimum annual revenue adjustment charge assessed to Customer #4 of the $27,609 in April 2004. Since no volumes were associated with this revenue adjustment, it was categorized as "Customer Revenue."

Please also refer to the "Special Cont" tab of each month electronic spreadsheet work-papers "WP" provided in Bay State's response to AG-9-01.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-29 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 4, lines 65-66. Explain the derivation of the Winter and Summer "Volumetric Revenue - First Block" for the Special Contract customers.

Response: The Special Contract "Volumetric Revenue – First Block" on lines 65 (Winter) and line 66 (Summer) consists of the actual 2004 six months of all volumetric charges to all special contract customers. Since all special contract customers' pricing provisions include a flat volumetric rate, the volumetric revenues were captured in the "First Block" lines. These revenues are relatively small, especially compared to the "Customer Revenue" presented on lines 62 and 63 primarily because the revenues from the Company's two largest customers were generated virtually entirely from the demand charges. Secondarily, the volumetric revenues were significantly lower because there were many months that some customers did not use any natural gas.

Please also refer to the "Special Cont" tab of each month electronic spreadsheet work-papers "WP" provided in Bay State's response to AG-9-01.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-30 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 4, lines 71-72. Should the notes on lines 71 and 72 read “line 10 * line 56" and “line 11 * line 57", respectively?

Response: Yes, the notes should be revised as shown in this request.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-31 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 4, lines 78-87. Please provide the source or derivation of the "Test Year Revenues Other Than Base" values found on these lines.

Response: These revenues, "Test Year Revenues Other Than Base", were derived from Schedule JAF-1-1 and its supporting detail. Please refer to sheet 2 of Schedule JAF-1-1 at line 19. The total revenues shown on this schedule for GAF and DAF are listed below in Table DTE-15-31. These revenue totals equal the revenues shown in the "Company Total" column on page 4 of Schedule JAF-2-1.

TABLE DTE-15-31

	Annual		Winter		Summer
Direct GAF:	$307,478,561	=	$249,622, 653	+	$57,855,998
Indirect GAF:	$ 19,129,611	=	$ 14,997,660	+	$ 4,131,951
Annualized DAF:	$ 6,962,862	=	$ 4,847,692	+	$ 2,115,170

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-32 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 4, line 95. Please explain the derivation of the average rate values for the C&I (42), C&I (52), C&I (43) and C&I (53) rate classes. Explain if the derivation of these numbers varies from the formula listed in the "Notes" column of this line and if the derivation of these numbers varies from the derivation of the numbers for the same rate classes on line 94.

Response: The formula listed in "Notes" column does not vary from the derivation, other than that the notes do not indicate which rate classes (columns) are combined. The average rates calculated on lines 94 and 95 of Schedule JAF-2-1 were developed for the C&I (42) and (43) rate classes, as a single group, and also for the C&I (52) and (53) classes, as a group of customers.

In order to compute the winter rates on line 94, the winter revenues on line 83 were added for the grouped customer classes. Then, these revenues were divided by the sum of the winter volumes for the grouped classes on lines 32 and 42 of Schedule JAF-2-1.

In order to compute the summer rates on line 95, the summer revenues on line 84 were added for the grouped customer classes. Then, these revenues were divided by the sum of the summer volumes for the grouped classes on lines 33 and 43 of Schedule JAF-2-1.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-36 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 11, line 276. Please explain why there is no number in the "Outdoor Lighting" column on this line.

Response: The "Winter Customer Charge Revenue" on line 276 were calculated (proposed Customer Charge times number of winter customer counts) and then used as input to developing the seasonal split of the volumetric revenue requirement (percentage of winter to annual volumetric revenue). Since the "Outdoor Lighting" customer class does not have a volumetric charge, this value is not needed for the computation of this customer class' rates.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-37 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 11, line 283-284. Please explain how these values are calculated for the "Outdoor Lighting" column of these lines.

Response: For "Outdoor Lighting", line 283 (Winter Percentage) was calculated as line 141 (Winter Target Base Revenue) divided by line 140 (Annual Target Base Revenue). Line 284 (Summer Percentage) was computed as 1 minus line 283.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-38 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 11, line 298. Please explain how the derivation of the values for the "Residential Heating Total" and "Residential Non-Heating Total" columns on this line. The values in these cells do not appear to agree with the equation in the "Notes" column of this line.

Response: For the residential customer classes, line 298 (Summer Rate) of Schedule JAF-2-1 was set equal to line 297 (Winter Rate). Line 297 was calculated as line 290 (Unit Marginal Cost) multiplied by line 293 (Ratio of MC). The summer and winter second block rates for these classes were set equal because non-seasonal rates were developed for the residential customer classes.

Please note that the "Notes" column for line 298 was set up as if the summer Unit MC could be applied to a ratio of MC (line 294 x line 291); however, that option was not used, primarily because the residential second block was based on the winter Unit MC for both seasons since rates were annualized.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-39 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 11, line 297-298. Please explain the derivation of the values for the "C&I (40) Low Annual High Winter" and "C&I (50) Low Annual Low Winter" columns on these lines. The values in these cells do not appear to agree with the equation in the "Notes" column of these lines.

Response: The rates for the C&I (40) and (50) rate classes were developed to be non-seasonal. A single non-seasonal rate was computed on line 297 and then this rate was copied to line 298. The logic in the "Notes" column contains the original formulas used for computations before the Company determined that it was necessary to change some of the customer classes' rate designs.

For these customer classes, line 297 was calculated as follows: (line 287 + line 288 – winter and summer volumetric revenue) divided by (line 53 + line 54 – winter and summer total therms).

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-40 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 12, line 297-298. Please explain the derivation of the values for the "C&I (43) E15. High Annual High Winter" column on these lines. The values in these cells do not appear to agree with the equation in the "Notes" column of these lines.

Response: The Company determined that is was necessary to combine the C&I (43) and (53) customer classes and have a single base rate structure for both classes. As a result, the rates computed on lines 297 and 298 of Schedule JAF-2-1 for the C&I (43) customer class use data for both the (43) and (53) customer classes.

The formula on line 297, which takes the combined classes' winter volumetric revenue requirement and divides by their total winter therms, is as follows:

[line 287 (43 customer class) + line 287 (53 customer class)] / [line 53 (43 customer class) + line 53 (53 customer class)].

The formula on line 298, which takes the combined classes' summer volumetric revenue requirement and divides by their total summer therms, is as follows:

[line 288 (43 customer class) + line 288 (53 customer class)] / [line 54 (43 customer class) + line 54 (53 customer class)].

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-41 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 11, line 311-312. Please explain how the derivation of the values for the "Residential Heating Total" and "Residential Non-Heating Total" columns on these lines. The values in these cells do not appear to agree with the equation in the "Notes" column of these lines.

Response: The formulas in the "Notes" column contain the logic of developing seasonal rates used before the Company decided to compute non-seasonal rates for the residential customer classes. The logic, of combining seasonal data, used for these lines is shown below:

Line 311 = $\frac{\text{Line 306 (Remaining Annual Revenue)}}{\text{Lines 265 +266 (First Block Therms for the Summer and Winter)}}$

Line 312 = Line 311

The summer and winter first block surcharges were set equal because non-seasonal rates were developed for the residential customer classes.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-42 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 12, line 319-320. Please explain the derivation of the values for the "C&I (43) E15. High Annual High Winter" column on these lines. The values in these cells do not appear to agree with the equation in the "Notes" column of these lines.

Response: The formulas in the "Notes" column contain the logic, of separately deriving rates for each class, used before the Company decided to compute a single rate structure for the C&I (43) and (53) customer classes. The logic, of combining the two classes' revenue requirement and billing determinants, used for these lines is shown below:

Line 319 = $\frac{\text{Line 315 (43 class) + Line 315 (53 class)}}{\text{Line 56 (43 class) + Line 56 (53 class)}}$

Line 320 = $\frac{\text{Line 316 (43 class) + Line 316 (53 class)}}{\text{Line 57 (43 class) + Line 57 (53 class)}}$

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-43 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 14, lines 361, 366 and 371. Please explain the derivation of the values in the "C&I (43) E15. High Annual High Winter" and "C&I (53) E15. High Annual Low Winter" columns on these lines. The values in these cells do not appear to agree with the equation in the "Notes" column of these lines.

Response: Since the C&I (43) and (53) customer classes were combined into a single rate structure, the development of the volumetric surcharge was computed for both classes together. The logic for the C&I (43) and (53) customer classes for lines 361, 366, and 371 is shown below.

Line 361 = $\frac{\text{Line 359 (43 class) + Line 359 (53 class)}}{\text{Line 52 (43 class) + Line 52 (53 class)}}$ – 1st iteration

Line 366 = $\frac{\text{Line 364 (43 class) + Line 364 (53 class)}}{\text{Line 52 (43 class) + Line 52 (53 class)}}$ – 2nd iteration

Line 371 = $\frac{\text{Line 369 (43 class) + Line 369 (53 class)}}{\text{Line 52 (43 class) + Line 52 (53 class)}}$ – 3rd iteration

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-44 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 13, line 375. Please explain how the values from line 349 are allocated between the "Residential Heating R&T-3" column and the "Residential Heating (4) Low-income" column.

Response: These values are test year revenues shown on both lines 349 and lines 375, and were initially computed on line 133 of Schedule JAF-2-1. Line 133 was calculated by summing the components of test year revenues shown on lines 113 through 131 of Schedule JAF-2-1. These components include: test year base revenue, direct cost of gas revenue, indirect cost of gas revenue, deferred gas costs, and LDAC revenue.

Note that the detail of these revenues are presented in Schedule JAF-1-2, with the exception that the test year deferred gas costs are derived in Schedule JAF-2-1, using the unit cost (line 100 and 101) provided from the ACOS times the billing determinants, as indicated in the "Notes" column on lines 125 and 126.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-45 Refer to Exh. BSG/JAF-2, Sch. JAF 2-1, at 13, line 375. Please explain how the values from line 349 are allocated between the "Residential Non-Heating R&T-1" column and the "Residential Non-Heat (2) Low-income" column.

Response: The values are test year revenues shown on both lines 349 and lines 375, and were initially computed on line 133 of Schedule JAF-2-1. Line 133 was calculated by summing the components of test year revenues shown on lines 113 through 131 of Schedule JAF-2-1. These components include: test year base revenue, direct cost of gas revenue, indirect cost of gas revenue, deferred gas costs, and LDAC revenue.

Note that the detail of these revenues are presented in Schedule JAF-1-2, with the exception that the test year deferred gas costs are derived in Schedule JAF-2-1, using the unit cost (line 100 and 101) provided from the ACOS times the billing determinants, as indicated in the "Notes" column on lines 125 and 126.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-49 Please describe the Company's policy regarding the enrollment of low-income customers.

Response: Customers are enrolled in the discount rate program through several methods.

(a) All customers that qualify for a Fuel Assistance benefit are automatically enrolled in the discount rate program retroactively back to the start of the current program year. In October of each year, just before the start of the next program year, these accounts are transferred into a "pending renewal" status while continuing to receive the discount rate until March of the following year. Once the company receives notification of eligibility in the next program year, the status on the account record is changed to an "approved" status. If the company is not notified by March 31 of renewed eligibility, the rate on the customer account is changed to the regular rate. Both heating and non-heating residential customers are eligible for this program.

(b) Customers receiving benefits under any means tested state funded program are also eligible for the discount rate program. Application may be made through a brochure mailed to the customer upon request or by completing an application recently installed on our web site. Upon receipt of these applications, the customer information is keyed into a file, which is forwarded to the Department of Transitional Assistance on a monthly basis for verification of eligibility. Once the verification takes place, the customer is enrolled in the program. Annual verifications are conducted thereafter. Additionally, applications may be made by completing and forwarding to the company an application included with a letter mailed to newly approved clients by a third party mail house.

(c) Customers receiving a MA Health benefit or a Veteran benefit are also eligible for the discount rate program and once supporting documentation of participation is forwarded to the company, the customer is enrolled.

The Company has also been working with the Department, EOHHS and other stakeholders participating in D.T.E. 01-106-B, in which the Department has recently undertaken an initiative with EOHHS to exchange a file of the company's customer base for matching purposes with EOHHS files in an effort to increase participation in the program.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-50 Does the Company de-certify low-income customers and make these customers re-apply as low-income customers every year? If so, please explain the origin of this policy. In addition, if low-income customers are de-certified, please explain how customers are billed during the time they are de-certified, after being re-certified as low-income customers.

Response: Customers approved for Fuel Assistance in a prior program year are decertified for the low income rate program after March 31 of the following program year if the company has not been notified of eligibility in the current program year.

Additionally, if when the annual verification is conducted with Transitional Assistance, the company is notified that a customer is no longer receiving state benefits, the customer will be removed from the low income rate program.

Please also refer to Bay State's response to DTE-15-49.

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Responsible: Joseph A. Ferro, Manager Regulatory Policy

DTE-15-51 When a new low-income customer applies for the low-income rates is s/he billed as a low-income customer retroactive to the date of application, or to the date that the low-income application is approved by the Company?

Response: With respective to the Fuel Assistance program, the customer will receive the discount rate retroactively back to their November bill in the current program year.

With respect to eligibility due to a state means tested program, eligibility of the discount rate begins on the date the company is notified.

Please refer to Bay State's responses to DTE-15-49 and DTE-15-50 for further explanation.